

सार्वजनिक आरोग्य विभागाच्या अखत्यारीत  
ट्रॉमा केअर युनिटमध्ये मॉड्युलर शस्त्रक्रिया  
गृह (OT) व मॉड्युलर अतिदक्षता विभाग (ICU)  
करीता प्रशासकीय मान्यता देणेबाबत.

**महाराष्ट्र शासन**  
**सार्वजनिक आरोग्य विभाग**  
**शासन निर्णय, क्रमांक: संकीर्ण २०२३/प्र.क्र.१८६/आरोग्य ३**

१० वा मजला, संकुल इमारत,  
जी.टी. रुग्णालय आवार, मुंबई - ४०० ००१.  
दिनांक : १३ ऑक्टोबर, २०२३.

**वाचा :**

- १) सह संचालक, आरोग्य सेवा रुग्णालये राज्यस्तर, मुंबई यांचे पत्र क्रमांक- आआसे/कक्ष-३/टे-६/Modular ICU & O.T./TCU/१८२३/२३ दिनांक ३१.०८.२०२३.

**प्रस्तावना:**

सार्वजनिक आरोग्य विभागांतर्गतची ट्रॉमा केअर युनिट लेवल-३ चे आहेत. सर्व रुग्णांना आपत्कालीन वैद्यकीय सेवा पुरविल्या जातात तसेच तज्ञ डॉक्टरांकडून तपासणी व शस्त्रक्रिया केल्या जातात, शल्य चिकित्सक, अस्थिव्यंग शल्य चिकित्सक तसेच भूलतज्ञ हे ट्रॉमा केअर युनिट सेंटर येथे संपूर्ण वेळ उपलब्ध राहून रुग्णांचे मुल्यांकन करून त्यांना आवश्यक वैद्यकीय व शस्त्रक्रिया सुविधा दिल्या जातात तसेच प्रयोगशाळा, रक्तपेढी व इतर आवश्यक सुविधा देखील ट्रॉमा केअर सेंटर येथे उपलब्ध असतात.

राज्यातील मंजूर ट्रॉमा केअर युनिट पैकी बांधकाम पूर्णत्वास आलेले १९ ट्रॉमा केअर युनिटमध्ये मॉड्युलर ऑपरेशन थिएटर आणि मॉड्युलर आय.सी.यु. युनिट तयार करणे आवश्यक आहे. राज्याची सन २००१ ची लोकसंख्या ९.६९ कोटी होती सन २०११ नुसार ११.२४ कोटी आहे. सन २०२३ ची लोकसंख्या १३.१६ कोटी आहे. सध्याची लोकसंख्या मोठ्या प्रमाणत वाढलेली आहे त्यानुसार अपघाताचे प्रमाण सुद्धा वाढत आहे. तसेच प्रत्येक अधिवेशनामध्ये ट्रॉमा केअर युनिट सुरु करण्याबाबत विविध संसदीय आयुधाद्वारे लोकप्रतिनिधीकडून लक्ष वेधण्यात येते. त्यामुळे बांधकाम पूर्णत्वास आलेले एकूण १९ ट्रॉमा केअर युनिट सुरु करण्यासाठी मॉड्युलर ऑपरेशन थिएटर आणि मॉड्युलर आय.सी.यु. युनिट तयार करणे आवश्यक आहे. राज्यातील एकूण १९ ट्रॉमा केअर युनिट मध्ये केंद्र शासनाच्या मार्गदर्शक सूचनानुसार मॉड्युलर ऑपरेशन थिएटर आणि मॉड्युलर आय.सी.यु. युनिट तयार करण्यासाठी रु.६३,९५,४८,७७८/- इतक्या रक्कमेस प्रशासकीय मान्यता देण्याची बाब शासनाच्या विचाराधीन होती.

**शासन निर्णय:**

राज्यामध्ये सध्यास्थितीत लेवल -३ या प्रकारचे ट्रॉमा केअर युनिट आहेत. केंद्र शासनाच्या मार्गदर्शक सूचनानुसार लेवल-३ या प्रकारातील प्रत्येक ट्रॉमा केअर युनिट करीता ५ खाटांची ICU

बेडची संख्या निश्चित करण्यात आली आहे. सद्यस्थितीमध्ये एकूण १९ ट्रॉमा केअर युनिटचे बांधकाम जवळपास पूर्ण झालेले आहे. त्याठिकाणी केंद्र शासनाच्या मार्गदर्शक सूचनानुसार मॉड्युलर ऑपरेशन थिएटर आणि मॉड्युलर आय.सी.यु. युनिट तयार करण्यास सोबतच्या प्रपत्र “अ” अनुसार ट्रॉमा केअर युनिट निहाय मान्यता देण्यात येत आहे.

०२. ट्रॉमा केअर युनिटवरील खर्चास खालील प्रमाणे मान्यता देण्यात येत आहे .

TCU संख्या	प्रत्येक TCU मधील ICU ची संख्या	प्रती TCU बेडची किंमत	एकूण ICU बेडची संख्या	एकूण ICU चा खर्च
१	२	३	४	५
१९	५	रु.१९,८८,३००	९५	रु.१८,८८,८८,५००

प्रत्येक TCU मधील OT ची संख्या	प्रती OT किंमत	एकूण OT ची संख्या	एकूण OT चा खर्च	एकूण (५+९)
६	७	८	९	१०
१	रु.२,३७,१८,९६२	१९	रु.४५,०६,६०,२७८	रु.६३,९५,४८,७७८

०३. केंद्र शासनाच्या मार्गदर्शक सूचनानुसार मॉड्युलर ऑपरेशन थिएटर आणि मॉड्युलर आय.सी.यु. युनिट तयार करतांना यामध्ये तज्ञ डॉक्टरांचा सल्ला घेणे आवश्यक आहे. त्यासाठी जिल्हास्तरावर तज्ञ डॉक्टरांची तसेच सार्वजनिक बांधकाम विभागाचे अभियंता यांची समिती गठीत करून समितीमार्फत सदर मॉड्युलर ऑपरेशन थिएटर आणि मॉड्युलर आय.सी.यु. युनिट Specifications नुसार योग्य असल्याची तपासणी करून प्रमाणित केल्यानंतर संबंधित कार्यकारी अभियंता सार्वजनिक बांधकाम विभाग यांच्यामार्फत देयके अदा करण्यात यावीत.

०४. परिच्छेद क्र. ३ नुसार देयके व तज्ञांची समिती खालील प्रमाणे गठीत करण्यात येत आहे:

अ.क्र.	समिती	पदनाम
१	जिल्हा शल्य चिकित्सक	अध्यक्ष
२	कार्यकारी अभियंता (सा.बा.वि.)	सदस्य सचिव
३	विशेषज्ञ (एम.डी. मेडीसिन)	सदस्य
४	जिव वैद्यकीय अभियंता	सदस्य
५	विशेषज्ञ (मास्टर ऑफ सर्जन)	सदस्य
६	विशेषज्ञ (मायक्रोबायलॉस्टी) वै.शि.वि./सा.आ.वि.	सदस्य

उपरोक्त समितीने दिलेल्या सुचनांचे पालन करणे संबंधित पुरवठादारास बंधनकाराक असेल.

०५. अटी व शर्ती:-

- राज्यातील सार्वजनिक आरोग्य विभागाच्या अखत्यारीतील बांधकाम पूर्ण झालेल्या ट्रॉमा केअर युनिट मध्ये केंद्र शासनाच्या मार्गदर्शक सूचनानुसार मॉड्युलर ऑपरेशन थिएटर आणि

मॉड्युलर आय.सी.यु. युनिट तयार करण्यासाठी NABH (National Accreditation Board for Hospital) यांच्या सोबत जोडण्यात आलेल्या Technical Specifications नुसार करण्यात यावे. (प्रत संलग्न)

- २) सदर खरेदीसाठी शासन निर्णय, उदयोग, उर्जा व कामगार विभाग, क्रमांक भांखस-२०१४/प्र.क्र.८२/ भाग III/उदयोग-४, दि.०१.१२.२०१६ अन्वये प्रसिध्द केलेल्या सुधारीत नियमपुस्तिकेत विहित केलेल्या कार्यपध्दतीचा अवलंब करण्यात यावा.
- ३) शासन निर्णय उदयोग उर्जा व कामगार विभाग दिनांक २४ ऑगस्ट, २०१७ अन्वये वस्तू व सेवा खरेदीसाठी गव्हर्नमेंट ई-मार्केटप्लेस (GeM) पोर्टल अनुसरायाची कार्यपध्दती व मार्गदर्शक सूचनांनुसारच निविदेची कार्यवाही करण्यात यावी. सदर कार्यवाही आयुक्त आरोग्य सेवा, आयुक्तालय, मुंबई यांच्यास्तरावर करण्यात यावी.
- ४) संपूर्ण प्रक्रिया राबवितांना केंद्रीय दक्षता आयोगाच्या मार्गदर्शक सूचनांचे (CVC Guideline) तंतोतंत पालन करण्यात यावे.
- ५) मॉड्युलर OT व मॉड्युलर ICU संख्यांमध्ये किंवा त्या अनुषंगाने इतर उपकरणांच्या संख्यांमध्ये बदल करावयाचा झाल्यास त्यासाठी शासनाची मान्यता घेणे बंधनकारक राहिल.
- ६) प्रशासकीय मान्यता देताना प्रक्रियेअंती निश्चित करण्यात आलेला दर हा बाजार भावापेक्षा कमी असल्याबाबत आणि संबंधित सेवा पुरवठादाराने या बाबींचा इतर ठिकाणी ज्या दराने पुरवठा केला आहे, त्या दरापेक्षा जास्त नसल्याबाबत खातरजमा करण्यात यावी.
- ७) मॉड्युलर OT व मॉड्युलर ICU ची गुणवत्ता व आवश्यक संख्या तपासणी करणे व त्यानंतर सदर पुरवठादाराचे देयके अदा करण्यास मान्यता देणे यांची जबाबदारी संबंधित समितीची राहिल.
- ८) याबाबतची (GeM) पोर्टलवर ई-निविदा आयुक्त आरोग्य सेवा, मुंबई यांच्या स्तरावर राबवावी व त्याबाबतचे देयके संबंधित कार्यकारी अभियांना सार्वजनिक बांधकाम विभाग यांनी अदा करण्यात यावेत.
- ९) प्रशासकीय मान्यता देण्यात आलेल्या रक्कमेमधूनच काम पूर्ण करण्यात यावा अधिकचा निधी लागणार नाही याची दक्षता घेण्यात यावी. (प्रपत्र “अ” यादीनुसार)
- १०) स्थानिक ग्रामीण नगर विकास संस्थेच्या संबंधित नियमानुसार बांधकाम परवानगी तसेच भोगवटा प्रमाणपत्र मिळविण्याची जबाबदारी सार्वजनिक बांधकाम विभाग यांची राहिल.
- ११) प्रपत्र “अ” नुसार १९ ट्रॉमा केअर युनिटमधील मॉड्युलर शस्त्रक्रिया गृह (OT) व मॉड्युलर अतिदक्षता विभाग (ICU) चे बांधकाम पूर्ण होऊन हस्तांतरित झाल्यानंतर तात्काळ पद भरती करून कार्यान्वित करण्यात यावे.

१२) प्रत्यक्ष काम करतेवेळी पर्यावरण विभाग, शासन निर्णय क्र.इएनव्ही-२०१३/प्र.क्र.१७७/तां.क.१ दि. १० जानेवारी, २०१४ मध्ये उल्लेख करण्यात आलेल्या मार्गदर्शक तत्वांनुसार कार्यवाही करण्यात यावी.

१३) सदर काम शासन निर्णय निर्गमित झाल्यापासून पुढील तीन महिन्यात कामे पूर्ण करण्यात यावी व केलेल्या कार्यवाहीचा अनुपालन अहवाल शासनास सादर करावा.

उपरोक्त अ.क्र. १ ते १३ मध्ये नमूद करण्यात आलेल्या अटी व शर्तीची पूर्तता करण्याची जबाबदार संबंधित आयुक्तालय, आरोग्य सेवा, मुंबई या कार्यालयाची तसेच कार्यकारी अभियंता व जिल्हा शल्य चिकित्सक यांची राहिल.

६. सदर कामावरील खर्च मागणी क्रमांक- एच- ८, मुख्यलेखाशिर्ष "४२१०- वैद्यकीय सेवा व सार्वजनिक आरोग्य सेवा यावरील भांडवली खर्च, ०१- नागरी आरोग्य सेवा विषम चिकित्सा, ११०- रुग्णालय व दवाखाने, (०१) इमारती, (०१)(०१) मोठी बांधकामे (कार्यक्रम), ५३- मोठी बांधकामे" (४२१०००१४) याखाली भागविण्यात यावा.

७. सदर कामासाठी आवश्यक असणाऱ्या खर्चाची तरतूद करण्याचा प्रस्ताव आयुक्त, आरोग्य सेवा, मुंबई यांनी त्वरीत शासनास सादर करावा.

८. हे आदेश शासन निर्णय, वित्त विभाग, क्रमांक- विअप्र २०१३/प्र.क्र.३०/विनियम, दिनांक १७.०४.२०१५ सोबतच्या परिशिष्ट, भाग पहिला, उपविभाग-पाच मधील अनुक्रमांक-१, परिच्छेद क्रमांक- १३४ अन्वये प्रशासकीय विभागांना प्रदान करण्यात आलेल्या अधिकारान्वये निर्गमित करण्यात येत आहे.

सदर शासन निर्णय महाराष्ट्र शासनाच्या [www.maharashtra.gov.in](http://www.maharashtra.gov.in) या संकेतस्थळावर उपलब्ध करण्यात आला असून त्याचा संकेतांक २०२३१०१३१२२५०७०५१७ असा आहे. हा आदेश डिजीटल स्वाक्षरीने साक्षांकित करून काढण्यात येत आहे.

महाराष्ट्राचे राज्यपाल यांच्या आदेशानुसार व नावाने.

(अशोक आत्राम)

सह सचिव, महाराष्ट्र शासन.

प्रत,

१. महालेखापाल- १ / २, महाराष्ट्र, (लेखा परिक्षा) (लेखा व अनुज्ञेयता), मुंबई/ नागपूर.

२. सचिव (बांधकामे) सार्वजनिक बांधकाम विभाग, मंत्रालय, मुंबई.
३. आयुक्त आरोग्य सेवा व अभियान संचालक, राष्ट्रीय आरोग्य अभियान, मुंबई
४. जिल्हाधिकारी (सर्व)
५. मुख्य कार्यकारी अधिकारी जिल्हा परिषद (सर्व)
६. संचालक, आरोग्य सेवा, मुंबई.
७. सह संचालक, आरोग्य सेवा, (खरेदी कक्ष), मुंबई.
८. उपसंचालक आरोग्य सेवा परिमंडळे (सर्व)
९. अधिक्षक अभियंता सार्वजनिक बांधकाम विभाग मंडळ (सर्व)
१०. जिल्हा शल्य चिकित्सक (सर्व)
११. जिल्हा आरोग्य अधिकारी (सर्व)
१२. जिल्हा कोषागार अधिकारी (सर्व)
१३. कार्यकारी अभियंता, सार्वजनिक बांधकाम विभाग (सर्व)
१४. वित्त विभाग (कोषागारे/ प्रशासन ५), मंत्रालय, मुंबई.
१५. कक्ष अधिकारी, सार्वजनिक आरोग्य विभाग (अर्थसंकल्प), मंत्रालय, मुंबई.
१६. निवडनस्ती (कार्यासन आरोग्य-३).

प्रपत्र “अ”

अनु. क्र.	ट्रॉमा केअर चे नाव	ICU बेडची संख्या	प्रति ICU बेडचे दर जीएसटीसह	एकूण किंमत	ओटी ची संख्या	दर प्रति ओटी जीएसटीसह	एकूण (सर्व)
१	ट्रॉमा केअर वडगाव मावळ जि. पुणे	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
२	ट्रॉमा केअर चाकूर जि. लातूर	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
३	ट्रॉमा केअर वणी, जि. यवतमाळ	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
४	ट्रॉमा केअर दारव्हा जि. यवतमाळ	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
५	ट्रॉमा केअर राळेगाव जि. यवतमाळ	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
६	ट्रॉमा केअर डहाणू जि. पालघर	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
७	ट्रॉमा केअर तिवसा जि. अमरावती	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
८	ट्रॉमा केअर इगतपूरी जि. नाशिक	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
९	ट्रॉमा केअर चांदवड जि. नाशिक	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
१०	ट्रॉमा केअर भिवापूर	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
११	ट्रॉमा केअर नवापूर	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
१२	ट्रॉमा केअर संगमनेर, अहमदनगर	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
१३	ट्रॉमा केअर सांगोला जि. सोलापूर	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
१४	ट्रॉमा केअर महाड जि. रायगड	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
१५	ट्रॉमा केअर चाळीसगाव जि.	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-

शासन निर्णय क्रमांक-२०२३/प्र.क्र.१८६/आरोग्य-३

## प्रपत्र “अ”

अनु. क्र.	ट्रॉमा केअर चे नाव	ICU बेडची संख्या	प्रति ICU बेडचे दर जीएसटीसह	एकूण किंमत	ओटी ची संख्या	दर प्रति ओटी जीएसटीसह	एकूण (सर्व)
	जळगाव						
१६	ट्रॉमा केअर मेहकर जि. बुलढाणा	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
१७	ट्रॉमा केअर उमरेड जि. नागपूर	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
१८	ट्रॉमा केअर मनोर जि. पालघर	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
१९	ट्रॉमा केअर अहमदपूर जि. लातूर	५	रु.१९८८३००/-	रु.९९४१५००/-	१	रु.२३७१८९६२/-	रु.३३६६०४६२/-
एकूण				रु.१८८८८८५००/-		रु.४५०६६०२७८/-	रु.६३९५४८७७८/-

# Technical Specifications for Supply, installation, testing & commissioning (SITC) of Modular Operation Theater Complex on Turnkey Basis AS PER NABH NORMS

Sr.No.	List of Items / Components
<b>A]</b>	<b>MODULAR SETUP COMPONENTS</b>
A.1	Modular Cleanroom Profile Panels for Ceiling
A.1.1	S.S. 304 Coving & Connecting Profile
A.2	Glass panels with SS 304 Framing
A.3	Hermetically sealed Door: MOC SS 304 / GI Powder-Coated
A.4	Antistatic conductive vinyl flooring along with Self-Leveling
A.5	X-ray View Screen – Twin Plate / Two Film
A.6	Magnetic Writing Board (White)
A.7	Ceiling Peripheral Lights / OT Luminaires: LED Type
A.8	Modular Storage Unit : MOC SS 304
<b>B]</b>	<b>MEDICAL GRADE HVAC SYSTEM with REAL-TIME REMOTE MONITORING &amp; DATA-LOGGING</b>
B.1	OT - Laminar airflow system with Terminal HEPA Filters
B.2	External Air Handling Unit (AHU)
<b>C]</b>	<b>AIR DISTRIBUTION SYSTEM</b>
C.1	HVAC Ducting : 24 G As per SMACNA class 'A'
C.2	HVAC Duct Insulation :
C.3	OT Return Air Module with Volume Control Damper
<b>D]</b>	<b>INTELLIGENT FIRE-SMOKE CONTROL &amp; ALARM SYSTEM</b>
<b>E]</b>	<b>CONDENSING UNITS (Outdoor Units) &amp; REFRIGERATION PIPING</b>
E.1	Condensing Units / Air Conditioning ODU (with stand-by facility)
E.2	Refrigerant piping in compliance with ASME B31.5
E.3	Drain Piping
<b>F]</b>	<b>OT USER INTERFACE (User Control Panels)</b>
F.1	OT User Interface: Capacitive Touch screen, Size 10 inch
F.2	OT Room Status Display
<b>G]</b>	<b>ELECTRICAL &amp; INSTRUMENTATION – for Both OT &amp; ICU Areas</b>
G.1	AHU Sub Panels
G.2	Power Cables
G.3	Control Cables
G.4	VFD – Variable Frequency Drive
G.5	DDC with Panel
G.6	Independent Distribution Box
G.6	Other Instrumentation Accessories
G.7	Earthing for the entire Modular OT & ICU Complex floor
G.8	Switchboards & Sockets, Internal Wiring for lights & sockets etc.
<b>H]</b>	<b>Validation &amp; Performance Testing - to be independently carried out per OT room</b>
<b>I]</b>	<b>EQUIPMENTS for OT</b>
I.1	Double arm Surgeon`s Pendant
I.2	Anesthesia Pendant : Single arm
I.3	Surgical Scrub
I.4	OPERATION THEATRE LIGHTS QTY – 01 NOS PER OT
<b>J]</b>	<b>PASSAGE AREA</b>

## Technical Specifications for Supply, installation, testing & commissioning (SITC) of Modular Operation Theater Complex on Turnkey Basis AS PER NABH NORMS

J.1	Modular Cleanroom Profile Panels for Ceiling
J.2	Ski-Lite fitting in False ceiling
J.3	Split Ac for Passage Area
J.4	Smoke Exhaust System for Passage along with Pressurization
<b>K]</b>	<b>OTHER ANCILLARY WORKS</b>
K.1	Sterile Air-Shower
K.2	Ancillary Civil Work including Demolition (if any)
K.3	Fabrication Work
K.4	Stabilizer
K.5	Generator (after due Voltage fluctuation analysis)
K.6	MGPS work inside OT

# Technical Specifications for Supply, installation, testing & commissioning (SITC) of Modular Operation Theater Complex on Turnkey Basis AS PER NABH NORMS

A] MODULAR SETUP COMPONENTS		
A.1	Modular Cleanroom Profile Panels for Ceiling	Qty. - As per site requirement
	<ul style="list-style-type: none"> <li>• Free-standing structure with PUF insulated Panels.</li> <li>• Composite construction of double skins - Front side (inside room) SS 304 &amp; back side (towards the wall) PPGI with a protective film thick over a GI profile framework along the periphery &amp; GI inter-locking section, with base runner.</li> <li>• The panel joints are sealed by silicone for a perfectly flush finish.</li> <li>• The panel core will consist of rigid polyurethane foam, which has been injected under high pressure.</li> </ul> <p><b>Panel specifications:</b></p> <ul style="list-style-type: none"> <li>➤ <b>Panel thickness</b> • 50mm for standard panels for ceilings</li> <li><b>Sheet Thickness</b> - Front SS 304 sheet thickness 0.8mm &amp; back PPGI sheet 0.6mm (90 GSM, 340Mpa)</li> <li>➤ <b>Infill:</b> PUF Insulation. Density 40 Kg/m<sup>3</sup> ± 2 Kg.</li> <li>➤ <b>Panel Joints:</b> The panels are joint together using GI section for interlocking &amp; leveling of panels. The panel joints shall have a seamless finish by applying silicon sealant.</li> <li>➤ <b>Panel Sizes:</b> Std. Width Min.1180mm x Length as per site requirement x 50mm thick</li> <li>➤ <b>Built-in Cut-outs</b> for HVAC / Light fittings etc.: strengthened around cut-outs &amp; covered with SS 304 sheet so that no material (infill) to be exposed.</li> <li>➤ <b>Standards:</b> Confirms to ASTM E 1730</li> </ul> <p><b>Note: The SS 304 &amp; PPGI panel shall be duly certified for its properties.</b></p>	
A.1.1	S.S. 304 Coving & Connecting Profile	Qty. - As per site requirement
	<ul style="list-style-type: none"> <li>• All joints between Panel to Panel, Wall to ceiling, Wall to Floor shall be covered with SS 304 coving section.</li> <li>• Minimum radius min.50 mm.</li> <li>• Joint between coving and surface shall be sealed with silicon sealant.</li> </ul>	
A.2	Glass panels with SS 304 Framing	
	<ul style="list-style-type: none"> <li>• Panel thickness: 50mm</li> <li>• Toughened glass – min. 6mm thick</li> <li>• The glass panels shall have an impregnated Graphical image to give a complete seamless finish as a part of the Modular panel structure.</li> <li>• The glass panel shall have no uneven / rough surfaces after the printing.</li> <li>• The image shall be finalized by the competent authority at the project site like the C.Surgeon /Dean</li> <li>• <b>Glass Panel Size – shall be 8ft. x 4ft. x 2 Nos. for OT rooms</b></li> </ul>	
A.3	Hermetically sealed Door: MOC SS 304 / GI Powder-Coated	Qty. - As per site requirement
	<p>Designed to fit flush into the wall panel system on both sides, fabricated from SS 304 or GI Powdered Coated Sheets.</p> <ul style="list-style-type: none"> <li>• <b>Thickness:</b> Shutter has sheet thickness of 0.8mm and the frame of 1.2mm. Door Leaf thickness of 46mm</li> <li>• <b>Width:</b> Standard 50/60/80 mm panel has frame width of 50/60/80 mm and shutter width of 42mm.</li> <li>• <b>Infill:</b> PUF Insulation</li> <li>• <b>Door fittings:</b> SS Ball Bearing Hinges, Latch Lock, Door Closer standard arm, Stainless Steel “D” Type Handle on One side, Stainless Steel Push Plates on “Push” Side, Kick Plates, Automatic Bottom Drop Seal, Concealed Tower Bolt (only for Double door),</li> <li>• <b>View Window:</b> Double insulated glass flushed to the door faces, 6mm thick plain Toughened View Glass with Black border &amp; Sealant</li> <li>• <b>Door lock:</b> Both side key operated locking arrangement</li> <li>• <b>Door size:</b> as per the site requirements. Door opening shall be as per requirements / space availability.</li> </ul>	

## Technical Specifications for Supply, installation, testing & commissioning (SITC) of Modular Operation Theater Complex on Turnkey Basis AS PER NABH NORMS

A.4	Antistatic conductive vinyl flooring along with Self-Leveling	Qty. - As per site requirement
	<b>Compliant to standards:</b> EN 1081/IEC 613404, EN 1815 & EN 12466, TVOC as per AgBB / DIBt Certifications, ISO 16000-6., <b>Properties:</b> <ul style="list-style-type: none"><li>• polyurethane reinforced, scratch resistant, fire resistant, chemical resistant, slip resistant,</li><li>• anti- fungi &amp; bacterial growth</li><li>• dimensional stability ≤ 0.40%, static electrical charger &lt; 2Kv,</li><li>• Flooring should be seamless with perfectly curved flush- coving, resistant to mechanical stress and dynamic loads and having protection characteristic</li><li>• Conductive Washable vinyl in Roll form.</li><li>• <b>Thickness:</b> 2.00mm</li></ul> <b>Self-Leveling:</b> <ul style="list-style-type: none"><li>• Flooring should be laid on Epoxy based self-leveling compound.</li><li>• <b>Self-Leveling thickness:</b> 2 to 3mm</li></ul>	
A.5	X-ray View Screen – Twin Plate / Two Film	Qty. - 1 No. per OT
	<ul style="list-style-type: none"><li>• <b>Light source:</b> LED, <b>Power consumption:</b> &lt; 30W,</li><li>• <b>Brightness:</b> &gt; 10,000 Lux, Provision for brightness control,</li><li>• Frame Dimensions: 880 x 503 x 29mm, Viewing Area: 736 x 440mm with Auto film insertion,</li><li>• Flicker free luminance with Digital Dimmer</li><li>• Fitment: Flushed with Modular wall panel</li></ul>	
A.6	Magnetic Writing Board (White)	Qty. - 1 No. Per OT
	<ul style="list-style-type: none"><li>• <b>MOC:</b> Magnetic laminated board bonded with 10mm high density fiber board,</li><li>• Magnetic writing board with duster,</li><li>• Colour - Pure white, Size: 600mm x 800mm with</li><li>• <b>Thickness:</b> 1.5mm</li></ul>	
A.7	Ceiling Peripheral Lights / OT Luminaires: LED Type	Qty. - As per site requirement
	<ul style="list-style-type: none"><li>• Clean Room Recessed Type Luminaires, IP-65grade</li><li>• Brightness: 1000 Lux illumination above 1 MTR floor level around the ICU Beds.</li><li>• The light fixture will be hermetically sealed from top side (ceiling side) with bottom opening for repair &amp; maintenance.</li><li>• <b>Size:</b> 2ft. x 2ft.</li></ul>	
A.8	Modular Storage Unit : MOC SS 304	Qty- 1 nos Per OT
	Storage cabinet of dimension 1800 x 1200 x 250mm (HxWxD) The storage cabinet shall be made of SS specification, same as used for wall & ceiling panels. SS 304Framing. Doors - PUF insulated double door with large glass view panel. The door panels of the cabinet shall be in Stainless steel & partly in tempered glass.Storage Shelves - Minimum 3 & Maximum 5 racks. Flushed to modular wall faces.	
B] MEDICAL GRADE HVAC SYSTEM with REAL-TIME REMOTE MONITORING & DATA-LOGGING		
	<ul style="list-style-type: none"><li>✓ Precision Temperature &amp; Humidity Controlled HVAC system</li><li>✓ Air Handling Units designed for each individual area as per specifications</li><li>✓ System capable of generating Bubble &amp; Sink as &amp; when required</li><li>✓ Self de-pressurization capable system to be designed &amp; installed</li><li>✓ Built-in Automated smoke &amp; fume exhaust mechanism</li><li>✓ Remote Monitoring &amp; Automatic Data-logging facility</li><li>✓ Fully IOT based Control &amp; Monitoring</li></ul>	

## Technical Specifications for Supply, installation, testing & commissioning (SITC) of Modular Operation Theater Complex on Turnkey Basis AS PER NABH NORMS

B.1	OT - Laminar airflow system with Terminal HEPA Filters	Qty. – 1 No. Per OT
	<ul style="list-style-type: none"> <li>• Laminar airflow system shall comply with internationally accepted standards.</li> <li>• Average air velocity below the plenum be 0.45 m/s <math>\pm</math> 20%.</li> <li>• Class of air at Diffuser grill (HEPA exit) – Class 100 / ISO Class 5 as per NABH guidelines.</li> <li>• The laminar airflow ceiling shall have Filters of H14 grade, EN 1822 standard.</li> <li>• Double tight seat system to prevent leakages from sides of filter gaskets, filter frame and pressure</li> <li>• SS 304 Mini-perforated plate/sheet; the vertical flow should achieve homogeneous flow.</li> <li>• The vertical flow should ensure a sterile area of stable air hygiene over the operating table.</li> <li>• <b>Plenum MOC:</b> Fully SS 304 with matt polish sheet thickness 1.2 mm.</li> <li>• <b>Plenum Dimensions: 8 ft. x 6 ft. with Minimum HEPA filter surface area of 58 Sft.</b></li> <li>• <b>Centre cut-out for OT light:</b> Size 600 x 600mm.</li> <li>• The filter module shall be provided with ports for aerosol sample &amp; differential pressure measuring.</li> <li>• Each Air filter capable to deliver 550m<sup>3</sup>/h air volume, pressure drop 130Pa</li> <li>• Filter Frame made of extruded aluminum &amp; compliant to Leak test <b>as per SMACNA Class A</b></li> <li>• Filters are fitted with a lip seal into an installation sub frame with two or four fixing points.</li> <li>• Equipped with a sealing integrity test facility, internal measuring tube &amp; pressure measurement point for monitoring the operating differential pressure. Suspension and pressure measurement points either at the side or at the top.</li> <li>• Casing made of sheet steel, SS 304 Diffusers for uniform air displacement.</li> </ul>	
B.2	External Air Handling Unit (AHU)	Qty.- 1 No. per OT Room each
	<ul style="list-style-type: none"> <li>• Supply, Installation, Testing and Commissioning of Double Skin Air Handling Units (Double-Tier / Single Tier) with all Screws &amp; Nut-bolts in SS &amp; all Exposed Screwed-end to be fitted with PVC caps.</li> <li>• <b>CAPABLE OF GENERATING SINK / BUBBLE AS PER REQUIREMENT</b></li> <li>• AHU Type – Draw-through</li> <li>• Profile - 16G Self Supporting Anodized Extruded Aluminum Hollow Section In Thermal Break Profile And Internal Coving Of Min. 15Mm</li> <li>• Corners &amp; Sections: Heavy Duty PVC With Internal Coving</li> </ul>	

# Technical Specifications for Supply, installation, testing & commissioning (SITC) of Modular Operation Theater Complex on Turnkey Basis AS PER NABH NORMS

- Panels - minimum 45 mm thick PUF (Non CFC with minimum density 40+ 2 kg/m<sup>3</sup>) sandwiched insulation panel
- Inner Skin & Outer Skin - 22G GI Plain 120Gsm, / 22G G.I. 120Gsm resp. Pre- Plasticized
- All Internal Framework in Aluminium Extruded Section.
- Coil Section to be in SS 304 Matt Finish

## **AHU Compliance to the below standards**

- Mechanical strength of Casing – En1886 D2
- Casing Air Leakage Test – En1886 L2
- Casing Thermal Transmittance & Thermal bridging – En 1886 T2 & Tb2
- Noise Level @ 1mtr. From the unit - < 85Db

## **AHU Supply Air Fan Capacity – as per site requirements**

**Fan Static:** Total Supply side Static Pa: 1500

## **Design Conditions:**

- **For OT - Temp  $20 \pm 2^{\circ}\text{C}$ , RH < 50%**

**AHU sections:** AHU to comprise of various sections as described below sequentially in the direction of airflow. AHU to be mounted on anti-vibration mounts. Each section to be properly sized to accommodate below mentioned components:

**Mixing Section:** Low Leakage extruded aluminum aerofoil opposed blade type Motorized fresh air damper with extended stem suitable for mounting of ON/OFF actuator •Low Leakage extruded aluminum aerofoil type opposed blade type return air damper suitable for manual operation •Provision for % Opening marking, locking & sealing arrangement.

- Flanged type F-5 Pre filters • Flanged type G4 Fresh air filter • Leak proof Hinged service door
- Pressure Measurement nozzles across F-5 filter with Magnehaulic Gauge (0-300 Pa) and PU Tube tubing.
- Magnehaulic Gauge to be properly enclosed in a box made from 0.8 thick GI sheet, of AHU body color.

**Note:** Air Face Velocities across H-13 & F-5 filters should not exceed 2.5 m/s.

**Plasma filter section:** 75 mm thick plasma filter

- UL validation for zero Ozone Emission

## **Cooling Coil Section:**

- D-X cooling coil inter-twined for each circuit
- Min.4 row (per Circuit) with copper tubes and aluminum fins
- Sine wave type fins with spacing of 12 / 13 fins per inch with Hydrophilic Coating
- Bypass factor (B.F.) of coil should not be more than 0.05
- Coil Fins- 36 Gauge & Coil tubes 26 g SS- 304 insulated: minimum 25 mm thick insulation (MOC of insulation shall be as per AHU manufacturer standard)
- PVC moisture eliminator removable sliding arrangement for cooling coil
- Condensate tray with drain pipe & G.I. U trap
- Concealed Drain Tray made out of 18G SS 304 in Matt Finish with slope to avoid water stagnation.
- Nitrile rubber insulation of suitable thickness to avoid condensation
- Access door to be provided for drain-pan section for maintenance
- Leak proof Hinged service door / Removable Panel with handles.

**Note:** Air Face Velocities across cooling coil should not exceed 2.5 m/s.

## **Supply Air Fan Section:**

- Properly balanced (statically and dynamically) to be selected so as to operate around 45Hz at Average Choke Condition. However, Blower should also be able to operate at Full Choke Condition & at 50Hz in

# Technical Specifications for Supply, installation, testing & commissioning (SITC) of Modular Operation Theater Complex on Turnkey Basis AS PER NABH NORMS

	<p>VFD by-pass mode.</p> <ul style="list-style-type: none"> <li>• Plug Fan/s with pressure ports and directly coupled to Motors and anodized aluminum/ stainless steel Bell mouth air outlet.</li> <li>• Fan housing with motor to be mounted on a common steel base on anti-vibration springs mounts.</li> <li>• Motor: High Energy Efficient "IE-3 Type", 415 ± 10% Voltage, 50Hz, 3 Phase, Squirrel Cage,</li> <li>• Totally enclosed Fan Cooled class "F" with IP55 Protection Induction Motor</li> <li>• Motor RPM- 1440 Rpm / 2880 Rpm</li> <li>• Blower Motor Mounting Assembly- In Aluminum Extruded Section &amp; Frame</li> <li>• Frame should be very sturdy to avoid Cracking during operation for longer duration</li> <li>• <b>Canvass Connection- Double wrapped, Lint-free, Fungal resistant &amp; Fire retardant canvass connection</b> (to avoid fire hazard between Fan &amp; AHU body) supported on frame.</li> <li>• Leak proof Hinged service door</li> <li>• Flow measurement device comprising of Calibrated Nozzle and Differential Pressure Transmitter</li> <li>• Lamp, Limit Switch &amp; Wiring</li> <li>• Double Glazed inspection window made from polycarbonate. Each glazing to be of minimum 6 mm thickness.</li> </ul> <p><b>Fine Filter / Bleed &amp; Discharge supply section:</b></p> <ul style="list-style-type: none"> <li>• Filter frame 16G Anodized Aluminum extruded section</li> <li>• Filter Type – Flange type</li> <li>• Filter Fixing arrangement- Threaded inserts as per Standard sizes on Aluminum framework tightened with Hard PVC Wing Bolts with in-built washer</li> <li>• Filter Face velocity NMT 500 fpm</li> <li>• Fine Filter: F-7</li> </ul> <p><b>Pressure Ports Across Filter Section:</b></p> <ul style="list-style-type: none"> <li>• High and Low Pressure Pvc Nozzle Ports with Provision of Silicon Tube to Be Provided</li> <li>• Fresh Air and Bleed Module with Al. Extruded Aerofoil Low Leakage Dampers with Epdm Food Grade Gasket</li> <li>• Supply and Return Cutout with Al. Extruded Aerofoil Low Leakage Dampers with Epdm Food Grade Gasket</li> <li>• Magnehelic Gauge of Appropriate Range to Be Provided to Monitor Pressure Drop Across All G-4 &amp; G-7 Filter Sections</li> <li>• View Panel: In Blower Section and Weather Proof Lamp Also to Be Considered</li> </ul> <p><b>PID controlled heater bank:</b></p> <ul style="list-style-type: none"> <li>• The heater bank must be provided with PID based control for heater operations.</li> <li>• The AHU Mounted bank will be modulated with multi-stage control</li> <li>• The heater bank must come with proper safety protection, overload trip protection and an electric panel with all the relevant components including switchgears and cabling.</li> </ul>
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C] AIR DISTRIBUTION SYSTEM		
C.1	HVAC Ducting : 24 G As per SMACNA class ‘A’	Qty. – as per site requirements
	Supply, Installation and Testing of CNC machine fabricated G.S.S. Ducting should be complete with - <ul style="list-style-type: none"><li>• supports, with GI rivets, nut-bolts, with Epoxy painted MS angle Flanges, with 5mm thick neoprene gaskets duly installed between flanges.</li><li>• Food grade silicon sealant shall be applied in the longitudinal length of a ducts &amp; for all angle flanges.</li></ul>	
C.2	HVAC Duct Insulation :	Qty. – as per site requirements
	<ul style="list-style-type: none"><li>• Duct Insulation with site-glued, Aluminum foil faced,</li><li>• Closed cell fire rated (FM approved) Nitrile Rubber Insulation of suitable density (40 - 60 kg / m³),</li><li>• Class “O” insulation as per thickness specified,</li><li>• All joints and corners should be finished with 50 MM wide cross linked oven type Aluminum Self Adhesive Tape.</li><li>• Size: 19mm for Supply Air Ducts, 13mm for Return Air &amp; Exhaust Air Ducts</li></ul>	
C.3	OT Return Air Module with Volume Control Damper	Qty. – Min. 4 Nos. per OT
	Supply, Installation, Testing and Commissioning of single skin (totally insulated on the outside surface with physically cross linked XLPE insulation and aluminum tapes) <ul style="list-style-type: none"><li>• MOC: SS 202 0.8mm thick with matt polish with aluminum polished / powder coated grill</li><li>• To be placed approx. 8 inches above from the floor</li></ul> Volume Control Dampers: manually operated dampers shall be provided for air flow control <ul style="list-style-type: none"><li>• Riser grill MOC Aluminum/GI Powder coated with opening</li><li>• Size - 450 x 600mm</li></ul>	
D] INTELLIGENT FIRE-SMOKE CONTROL & ALARM SYSTEM		
	<ul style="list-style-type: none"><li>• The OT rooms should be provided with independent fire-smoke control &amp; alarm system.</li><li>• Multi-point fire-smoke sensing system</li><li>• Automated activation of the system with audio-visual alarm</li><li>• Independent control box to be provided for this system</li><li>• Provision for conducting Mock-drill as a part of NBC protocol</li></ul>	
E] CONDENSING UNITS (Outdoor Units) & REFRIGERATION PIPING		
E.1	Condensing Units / Air Conditioning ODU (with stand-by facility)	Qty. – As per site system design
	<ul style="list-style-type: none"><li>• Supply, Installation, Testing &amp; Commissioning of Air-cooled condensing unit.</li><li>• Outdoor unit should be completed with copper piping, filled with R410a refrigerant gas,</li><li>• Including nitrile rubber Insulation, electrical cabling, thermostatic expansion valves, liquid line strainer, HP, LP switches, control panel along with all other required electrical</li><li>• With supports, tray, MS stands etc.</li><li>• Consider 15 meter length between AHU &amp; Outdoor Unit.</li><li>• Stand-by system -Each condensing unit should have standby compressors with multiple refrigeration circuits and components.</li><li>• Capacity – as per site requirements</li></ul>	
E.2	Refrigerant piping in compliance with ASME B31.5	
	Supply, Installation, Testing & Commissioning of copper piping with all necessary fittings for refrigerants <ul style="list-style-type: none"><li>• Copper tubing, Expansion Valve, Dryer Filter, Gas charging etc. refrigeration accessories</li></ul>	

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<b>E.3</b>	<b>Drain Piping</b>	
	<ul style="list-style-type: none"> <li>• Supply, Installation &amp; Testing</li> <li>• Insulated GI 'B' class drain piping with aluminium foil faced nitrile rubber</li> <li>• insulation, with SORF flanges, nut-bolts, supports with wooden block etc. duly installed.</li> </ul>	
<b>F]</b>	<b>OT USER INTERFACE (User Control Panels)</b>	
<b>F.1</b>	<b>OT User Interface: Capacitive Touch screen, Size 10 inch</b>	<b>Qty. – 1 No. Per OT</b>
	<p>Capacitive Touch screen</p> <ul style="list-style-type: none"> <li>• Industrial application based Virus-free system</li> <li>• Independent PLC working logic</li> <li>• Real-time Clock - Elapsed Time</li> <li>• Room temperature &amp; Relative Humidity (RH) display &amp; control settings</li> <li>• HEPA pressure display (digital)</li> <li>• Medical Gas status display with Alarms</li> <li>• General Lighting Controls - Ceiling periphery luminaire lighting switches</li> <li>• OT Light Control – Main Dome &amp; Satellite Dome</li> <li>• Digital X-ray Viewer</li> <li>• Inbuilt Media Player - Hands-free telephone</li> <li>• <b>Note – I/O Control box should be located outside the OT room.</b></li> </ul>	
<b>F.2</b>	<b>OT Room Status Display</b>	<b>Qty. – 1 No. Per OT</b>
	<ul style="list-style-type: none"> <li>• OT Room Temperature, Humidity &amp; Room Pressure</li> <li>• Automated De-fumigation (Fumes Exhaust)</li> <li>• Emergency OT Room Lighting Switch</li> <li>• Economy Mode / Night Mode for ensuring continuous Sterile Air inside the OT even during idle hours</li> </ul>	
<b>G]</b>	<b>ELECTRICAL &amp; INSTRUMENTATION – for Both OT &amp; ICU Areas</b>	
<b>G.1</b>	<b>AHU Sub Panels</b>	<b>Qty. – 1 No. per AHU</b>
	<ul style="list-style-type: none"> <li>• Supply, Installation, Testing &amp; Commissioning of floor mounted local AHU panel</li> <li>• With VFD &amp; with bypass arrangement</li> <li>• MOC - 16 gauge CRCA powder coated construction suitable to house VFD (with harmonic filter) for fan motor.</li> <li>• The panel shall also accommodate power for heaters (wherever specified as per air flow schematics).</li> <li>• The panel shall be mounted on channels suitable for grouting to the floor.</li> <li>• Panel should be compartmentalized with front/rear maintenance and with top entry for incoming &amp; outgoing cables.</li> <li>• This panel shall be supplied with the Incomer MCCB of suitable rating, Phase indication &amp; trip status lamps, with cable alleys, necessary contactors and control switchgears with necessary arrangement for supply to heaters, fire dampers, VFD.</li> <li>• This panel shall be provided with ventilation fan for VFD &amp; shall be installed near to AHU</li> <li>• Panel shall be provided with appropriate earth bus / connection provisions for providing the required earthing.</li> <li>• Emergency push buttons with mushroom head to be provided.</li> <li>• <b>Interlocking B/W fans, FA, EA &amp; SA dampers and also with various other process equipment's if required. Fault Level - 25kA.</b></li> </ul>	

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<b>G.2</b>	<b>Power Cables</b>
	<p>Supply, Laying, Testing and Commissioning of Industrial Grade Flexible single core / multi-core cables as per site requirements</p> <p><b>Standards</b></p> <ul style="list-style-type: none"> <li>• <b>Confirming to IS 694/ IS 17048/ BS 6231/ BS 6004/ BS 7211 / BS 50525-2-11, 2-31, 3-11</b></li> <li>• <b>FRLSH (Flame Retardant Low Smoke Halogen)</b></li> <li>• <b>RoHS &amp; REACH Compliant</b></li> </ul> <ul style="list-style-type: none"> <li>• 1.1KV Grade XLPE/PVC insulated aluminum/copper multi strands conductor steel of Armoured/flexible braid power cables of various sizes as per the requirement.</li> <li>• Laying of Cables in horizontal/vertical formation on wire mesh cable trays, supported along RCC/steel structures if required, pipe racks and cable supports provided,</li> <li>• Includes unloading, shifting upto site at various location/levels, unpacking &amp; inspection.</li> <li>• The scope includes clamping of cables by readymade spacers, saddles or clamps fabricated out of Aluminum strip 3 mm thick along vertical runs and wherever specified, cutting of the cable as per actual measurement/cable schedule, Teasing and Clamping of Cable on cable tray Velcro tap of minimum 20mm width or clamping materials in Aluminum or PVC cable tie as per site hygiene level and hardware etc.,</li> <li>• Supply &amp; providing cable tags made out of Aluminum strip and 75x20 mm in size with cable number and size punched on it.</li> <li>• Cable tags shall be tied to cables at every 20-meter interval and at both the ends.</li> </ul>
<b>G.3</b>	<b>Control Cables</b>
	<p>Supply, Laying, Testing and Commissioning of Control cables</p> <ul style="list-style-type: none"> <li>• For all controlling operations as shown in Schematics, including for all actuators, heaters, Fan interlocking and other equipment's to be controlled.</li> </ul>
<b>G.4</b>	<b>VFD – Variable Frequency Drive</b> <b>Qty. - 1No. per AHU Panel</b>
	<ul style="list-style-type: none"> <li>• Supply and Installation of HVAC Series, VFD with 4nos PID Loop and (Smart Logic Controller) Built in</li> <li>• With additional I/O Card suitable for hospital application.</li> <li>• VFD to be suitable for Normal Induction Motor and PM Motor Operation.</li> <li>• DC to be Built in to limit Harmonic Distortion.</li> <li>• The VFD should have in built controller for closed loop HVAC functions.</li> <li>• <b>Rating – As per site requirements</b></li> </ul>
<b>G.5</b>	<b>DDC with Panel</b> <b>Qty. - 1No. per AHU Panel</b>
	<ul style="list-style-type: none"> <li>• The DDC controllers shall be 32 bit microprocessor based standalone and networkable type with real time clock and historical database of min 1 Mb.</li> <li>• The DDC's shall be capable of peer to peer communication without help of system interface controller or PC.</li> <li>• With all suitable metal enclosures 1mm thick, IP42 enclosure, top cable entry, powder coated.</li> <li>• The DDC controller housed in panel with necessary accessories like power supply Unit, Protection Devices and Complete wiring.</li> </ul>
<b>G.6</b>	<b>Independent Distribution Box</b> <b>Qty. - 2 Nos.</b>
	<p>Separate distribution boxes shall be provided for the separation of cabling from the OT room to the existing DG of the hospital. Another DB should be provided for the cabling from the OT room to the new DG which will take care of the new load.</p>

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<b>G.7</b>	<b>Other Instrumentation Accessories</b>	<b>Qty.- As per design requirements</b>
	<ul style="list-style-type: none"> <li>• Temperature &amp; RH Sensors &amp; transmitters</li> <li>• Smoke Sensors – International CE certified</li> <li>• Velocity Sensor</li> </ul>	
<b>G.8</b>	<b>Earthing for the entire Modular OT &amp; ICU Complex floor</b>	<b>Qty. – as required by electrical design</b>
	<p>Supply and installation of Chemical earthing station</p> <ul style="list-style-type: none"> <li>• Dimensions - 2.0 mtr. Long, dia. 80 mm copper coated Pipe in Pipe type</li> <li>• The contractor has to make a 3.5 mtr. deep 450 mm dia. bore in hard rock / soft soil, fill the outer side 100 mm dia. of the bore with Black cotton soil and Balance 250 mm dia bore and 3100 mm deep shall be filled Chemical earth electrodes treatment as per standard drawing.</li> <li>• 4 sq. mm Cu. Wire Green Colour only, 50 x 10 mm GI. Strip, EARTHING OUTLET FOR ELECTROSTATIC DISCHARGE with 2.5 Sq.mm Cuwire with crocodial clamps and front SS cover.</li> </ul>	
<b>G.9</b>	<b>Switchboards &amp; Sockets, Internal Wiring for lights &amp; sockets etc.</b>	
	<p>Switchboards &amp; Sockets with necessary number of modular box, polycarbonate front and rear plate, modular switches, switch sockets &amp; blank plates. ▪ Switchboard points &amp; Light points</p> <ul style="list-style-type: none"> <li>• Switchboard Wiring 3C x 2.5 Sq.mm Cu. PVC Flexible FR Cable including Termination at both ends.</li> </ul>	
<b>H]</b>	<b>Validation &amp; Performance Testing - to be independently carried out per OT room</b>	
	<ul style="list-style-type: none"> <li>• Validation, Performance testing, balancing of the HVAC system designed to achieve the <b>ISO 14644/1 classification</b> Parameters <ul style="list-style-type: none"> <li>• <b>OT specifications - ISO Class 5 at LAF Plenum Exit &amp; ISO Class 8 in the OT room</b></li> </ul> </li> </ul> <p>Clean room validation to be done OT at rest &amp; in operation conditions.</p> <ol style="list-style-type: none"> <li>Air balancing with Flow Hood</li> <li>Room Pressure Balancing</li> <li>HEPA Filter Integrity Test</li> <li>Particle count test</li> </ol>	
<b>I]</b>	<b>EQUIPMENTS for OT</b>	
<b>I.1</b>	<b>Double arm Surgeon`s Pendant</b>	<b>Qty. - 01 Nos. / OT</b>
	<p>MOC - High strength MS/aluminum, powder coating on the surface, dustproof antifouling construction.</p> <ul style="list-style-type: none"> <li>• Double arm - 1000mm + 1000mm in size - will be ceiling mounted -modular in construction.</li> <li>• Powder coated - rectangular body shape - at least one monitor tray for mounting the monitor - 2equipment shelf with 1 shelf having a drawer for keeping essential items.</li> <li>• Power Outlets - at least six (4 nos.) power outlets of 5-15 A sockets.</li> <li>• Configuration - 2 Nos. Tray (400 x 500mm) &amp; 1 Nos. Drawer (400 x 500 x 140mm)</li> <li>• Basket provision - Size 300 x 200 x 100mm</li> <li>• Weight carrying capacity - not be less than 100 kg. Per arm</li> <li>• Ground clearance - at least 1.20m.</li> <li>• Rotation (Swivel) - wide angle of rotation of 342 degrees at pivot points and a maximum radius rotationof 2600 mm. to position the medical equipment`s according to the need of the surgeon</li> <li>• Streamlined design structure, for laminar-flow-optimized use.</li> <li>• Cavity design main column for safety</li> <li>• Flexible design for the tray where in the height of the tray can be adjusted.</li> <li>• <b>Certifications: - ISO 13485, ISO 9001, CE</b></li> </ul>	
<b>I.2</b>	<b>Anesthesia Pendent : Single arm</b>	<b>Qty - 01 Nos/OT</b>

## Technical Specifications for Supply, installation, testing & commissioning (SITC) of Modular Operation Theater Complex on Turnkey Basis AS PER NABH NORMS

	<p>MOC - High strength MS/aluminum, powder coating on the surface, dustproof antifouling construction.</p> <ol style="list-style-type: none"> <li>1. Pendant should be Single arm</li> <li>2. Powder coated - rectangular body shape</li> <li>3. Power Outlets - at least six (6 nos.) power outlets of 5-15 A sockets.</li> <li>4. Equipotential Interface - 6Nos.</li> <li>5. Internet Interface (CAT 5) Size (79 x 44mm) - 1Nos.</li> <li>6. Gas Outlet provision</li> <li>7. Configuration - 2 x Oxygen + 1 x Nitrous Oxide + 2 x Vacuum + 2 x Air complete with all connections</li> <li>9. Provision to mount 1 no. IV Pole &amp; Syringe Infusion Pump</li> <li>10. Tray - 2 Nos. tray size 400 x 500mm</li> <li>11. Rotation (Swivel) - wide angle of rotation of 342 degrees at pivot points</li> <li>12. Cavity design in the main column for safety and management of pipeline.</li> </ol> <p><b>Certifications: - ISO</b></p>
<b>I.3</b>	<p><b>Surgical Scrub</b> <span style="float: right;"><b>Qty. – 01 NOS PER SITE</b></span></p>
	<ul style="list-style-type: none"> <li>• Capacity - Single (1) Bay Scrub Sink</li> <li>• Configuration - Wall mounted</li> <li>• Operations - Manual / Mechanical through Foot switch &amp; / Or Elbow action</li> <li>• Hardware - Mixture valve (1 No.) and Solenoid valves (2 Nos.)</li> <li>• The scrub sink is provided with front access panel for ease of maintenance &amp; repair.</li> <li>• MOC : Stainless Steel Grade 304, Anti-splash metal body construction polished finish</li> <li>• Mixer arrangement for hot and cold water.</li> <li>• <b>Size- as per site requirement</b></li> <li>• <b>Note</b> – provision of hot water To be done by Tenderer (Hospital)</li> </ul>
<b>I.4</b>	<p><b>OPERATION THEATRE LIGHTS QTY – 01 NOS PER OT</b></p>
	<ul style="list-style-type: none"> <li>• LED Surgical Lights illuminate the surgical site for optimal visualization of small, low contrast object at varying depths in incisions and body cavity</li> <li>• The Light shall adopt latest LED technology to create a homogeneous light patch without emitting any infra rays</li> <li>• The light system shall be triple arm with double light heads, one major, one satellite and third arm with monitor</li> <li>• LED based, shadow-less lighting 100% dust-proof design ensuring no open spaces or cavity for dust penetration inside the dome.</li> <li>• Dome diameter should be 500mm each dome • Dome Design-100% dust-proof design ensuring no open space/cavity for dust penetration inside the dome</li> <li>• Illumination (LUX) Adjustment Range (in steps)- In 08 steps from Zero(0) to 100%</li> </ul> <p><b>Maximum Illumination (LUX) dome-1,60,000 Lux</b></p> <ul style="list-style-type: none"> <li>• Color Temperature (K)-4500K(±)300</li> <li>• Spot Diameter (mm)-120-300</li> <li>• Lighting Depth (mm)-≥1200</li> <li>• CRI (Ra), CRI(R9)-≥96, ≥96</li> <li>• Lifetime LED's- Approx. 50,000 hours</li> <li>• Power Consumption -only 48 watts/per dome</li> </ul> <p><b>Intelligent Lighting Modes (Inbuilt, Auto Lighting Illumination)-</b></p> <ul style="list-style-type: none"> <li>• Minimally Invasive Surgery • Minor Surgery • Deep Cavity illumination mode for major surgeries</li> </ul> <p><b>Sterilizable Handles-</b></p> <p>Located centrally on each dome for easy access &amp; movement. Standard pack of four(4) handles shall be provided with each unit.</p> <p><b>Individual LED Replacement-</b></p> <p>Designed to allow each individual LED to be replaced whenever required.</p> <p><b>Controls-</b></p> <p>Unit should have dual control of all the functions from the OT Light panel and wireless remote control</p> <p><b>ARMS</b></p> <ul style="list-style-type: none"> <li>• <b>GERMAN ONDAL ARMS with complete 360-degree rotation of the domes possible in both the</b></li> </ul>

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	<p><b>domes including the dome with camera system</b></p> <p><b>Rotation -For Major and Satellite Domes:</b></p> <ul style="list-style-type: none"> <li>●From Top Central Axis -Complete 360°</li> <li>●From Axis of the Spring Arms-Complete 360°</li> <li>●From Dome Axis-Complete 360°</li> </ul> <p><b>Rotation -For Monitor Arm:</b></p> <ul style="list-style-type: none"> <li>●From Top Central Axis -at least 330°</li> <li>● From Axis of the spring Arms -at least 330°</li> <li>●From Monitor Frame -atleast 330°</li> </ul> <p><b>Full HD Camera</b></p> <ul style="list-style-type: none"> <li>●Integrated Sony HD camera -3 Megapixel</li> <li>●Optical Zoom:range 10x to 12x</li> <li>●Anti-Flicker and auto focus</li> <li>●Location of the Camera in the centre of the light head inside the handle for easy focusing</li> <li>●Having output BNC-Composite -US&amp;-HDMI/HD-SDI</li> <li>●Auto /manual white balance</li> </ul> <p><b>MEDICAL GRADE MONITOR</b></p> <ul style="list-style-type: none"> <li>●High resolution LCD medical grade monitor compatible with the camera system and the recording system</li> <li>●Size 24-26 inch or more diagonally.</li> <li>●To be mounted on the third arm of the OT Light system</li> </ul> <p><b>HD SDI Recording System from OEM</b></p> <ul style="list-style-type: none"> <li>●Multimedia HD SDI Digital recording system for recording on hard disk PC with 2 TB storage</li> <li>●17" Color monitor</li> <li>●100 m HD SDI cable shall be provided for connecting the camera with the HD SDI recorder</li> </ul> <p><b>Preventive support</b></p> <ul style="list-style-type: none"> <li>● 2 Sets of PCB's and LED's will be provided along with the unit to keep the OT Light operational with uptime of 100%</li> <li>●Standards/Certifications-International CE,USFDA,ISO-9001,ISO13485</li> </ul>	
<b>J]</b>	<b>PASSAGE AREA</b>	
<b>J.1</b>	<b>Modular Cleanroom Profile Panels for Ceiling</b>	<b>Qty - as per the site requirements</b>
	<ul style="list-style-type: none"> <li>● Free-standing structure with PUF insulated Panels.</li> <li>● Composite construction of double skins – <b>Both sides PPGI</b> with a protective film thick over a GI profile framework along the periphery &amp; GI inter-locking section, with base runner.</li> <li>● The panel joints are sealed by silicone for a perfectly flush finish.</li> <li>● The panel core will consist of rigid polyurethane foam, which has been injected under high pressure.</li> </ul> <p><b>Panel specifications:</b></p> <ul style="list-style-type: none"> <li>➤ <b>Thickness:</b> Panel thickness 50mm, PPGI sheet thickness 0.6mm (90 GSM, 340Mpa, RAL 9002)</li> <li>➤ <b>Infill:</b> PUF Insulation. Density 40 Kg/m<sup>3</sup> ± 2 Kg.</li> <li>➤ <b>Panel Joints:</b> The panels are joint together using GI section for interlocking &amp; leveling of panels. The panel joints shall have a seamless finish by applying silicon sealant.</li> <li>➤ <b>Panel Sizes:</b> Std. Width Min.1180mm x Length as per site requirement x 50mm thick</li> <li>➤ <b>Built-in Cut-outs</b> for HVAC / Light fittings etc.: strengthened around cut-outs &amp; covered with PPGI sheet so that no material (infill) to be exposed.</li> </ul>	
<b>J.2</b>	<b>Ski-Lite fitting in False ceiling</b>	<b>Qty. – 1 No.</b>
	<p>Supply, &amp; fitment of Stretch ceiling type OR Alabaster type ceiling</p> <ul style="list-style-type: none"> <li>● This ceiling should be enclosed in a appropriate Aluminum frame after making a cut-out in the modular profile PPGI PUF panel ceiling</li> <li>● The image / picture would be confirmed by the User.</li> <li>● To be fitted flushed to the false ceiling with required hardware with standard framework &amp; sealant.</li> </ul>	

## Technical Specifications for Supply, installation, testing & commissioning (SITC) of Modular Operation Theater Complex on Turnkey Basis AS PER NABH NORMS

	● Size – Min. 15 Sft.																							
J.3	Split Ac for Passage Area																							
	Rating – Min. 3 Star Invertor AC Capacity to be determined as per site requirements																							
J.4	Smoke Exhaust System for Passage along with Pressurization																							
	The OT passage area should be should be pressurized & fitted with an automated smoke exhaust mechanism to ensure efficient & effective protection.																							
K]	OTHER ANCILLARY WORKS																							
K.1	Sterile Air-Shower	Qty- 01 Nos For Passage																						
	<div>▪ MOC – 1mm SS 304,</div> <div>▪ Internal Dimensions – 800(W) x 800(D) x 1950(H)</div> <table><tr><td>HEPA Filter</td><td>HEPA Filtered Air (0.3 Micron, 99.97% Efficiency)</td></tr><tr><td>Pre -Filter</td><td>5 micron Aluminium, 95% Efficiency</td></tr><tr><td>Motor Blower</td><td>Suitable motor blower assembly EBM MOTOR</td></tr><tr><td>Door</td><td>Stainless steel double walled door with polycarbonate / Toughened sandwiched view panels.</td></tr><tr><td>Door Interlocking</td><td>stainless steel Electromagnetic interlocking system</td></tr><tr><td>Door Opening</td><td>Straight entry and straight exit with 90° door opening.</td></tr><tr><td>Switches</td><td>ON/OFF switches for door entry and exit.</td></tr><tr><td>Light</td><td>PHILIPS</td></tr><tr><td>Operating Panel</td><td>Microprocessor based Operated Control on/off switch &amp; Emergency Switch Push Button.</td></tr><tr><td>DOP Test Port</td><td>SS 304</td></tr><tr><td>Air jet Nozzle</td><td>SS 304 NOZZLES</td></tr></table>		HEPA Filter	HEPA Filtered Air (0.3 Micron, 99.97% Efficiency)	Pre -Filter	5 micron Aluminium, 95% Efficiency	Motor Blower	Suitable motor blower assembly EBM MOTOR	Door	Stainless steel double walled door with polycarbonate / Toughened sandwiched view panels.	Door Interlocking	stainless steel Electromagnetic interlocking system	Door Opening	Straight entry and straight exit with 90° door opening.	Switches	ON/OFF switches for door entry and exit.	Light	PHILIPS	Operating Panel	Microprocessor based Operated Control on/off switch & Emergency Switch Push Button.	DOP Test Port	SS 304	Air jet Nozzle	SS 304 NOZZLES
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K.2	Ancillary Civil Work including Demolition (if any)	Qty. – As per site requirements																						
	All jobs such as demolition / breaking / reconstruction of doors / windows / walls etc. required for Modular OT /ICU related work: installation / fitment of Doors / Windows / Scrub / Waterproofing / civil foundation etc. required for completion of the said modular setup.																							
K.3	Fabrication Work	Qty. – As per site requirements																						
	Fabricated structure / shed for AHU & Outdoor units, Supports / Stands / Ladders for Ducting, AHU, ODU,Electrical wiring & Copper piping, Drain etc.																							

## Technical Specifications for Supply, installation, testing & commissioning (SITC) of Modular Operation Theater Complex on Turnkey Basis AS PER NABH NORMS

<b>K.4</b>	<b>Stabilizer</b>	<b>Qty. &amp; Rating – as per site requirements</b>
	INDUSTRIAL GRADE 3Ph Servo Controlled Voltage Stabilizer. I/p (300-460)VAC O/p (415)VAC. +/-1%	
<b>K.5</b>	<b>Generator (after due Voltage fluctuation analysis)</b>	<b>Qty- As per site requirements</b>
	Suitable capacity generator for Modular OT /ICU complex with AMF panel and wiring.	
<b>K.6</b>	<b>MGPS work inside OT</b>	<b>Qty.- As per site requirements</b>
	<p>MGPS piping inside OT / Pedant connections / Gas Zonal Valve box outside OT to comply with the Standards mentioned below: <b>BS EN ISO 7396 - 1, NFPA 99, Type 1, HTM 02-01</b></p> <p>The bidder shall provide for appropriate gas pipelines to match the existing provision of gases in the hospital.</p>	

# Technical Specifications for Supply, Installation, Testing & Commissioning (SITC) of Modular I.C.U Complex on Turnkey Basis as per NABH norms

Sr.No.	List of Items / Components
<b>A]</b>	<b>MODULAR SETUP COMPONENTS</b>
A.1	Modular Cleanroom Profile Panels for Ceiling
A.1.1	Bed-Head Panel FOR ICU
A.1.2	S.S. 304 Coving & Connecting Profile
A.3	Hermetically sealed Door: MOC SS 304 & GI Powder-Coated
A.4	Antistatic conductive vinyl flooring along with Self-Leveling
A.5	X-ray View Screen – Twin Plate / Two Film
A.6	Magnetic Writing Board (White)
A.7	Ceiling Peripheral Lights / ICU Luminaires: LED Type
<b>B]</b>	<b>MEDICAL GRADE HVAC SYSTEM with REAL-TIME REMOTE MONITORING &amp; DATA-LOGGING</b>
B.2	ICU - Terminal Filter Box with Mini-pleat HEPA Filters
B.3	External Air Handling Unit (AHU)
<b>C]</b>	<b>AIR DISTRIBUTION SYSTEM</b>
C.1	HVAC Ducting : 24 G As per SMACNA class 'A'
C.2	HVAC Duct Insulation :
<b>D]</b>	<b>INTELLIGENT FIRE-SMOKE CONTROL &amp; ALARM SYSTEM</b>
<b>E]</b>	<b>CONDENSING UNITS (Outdoor Units) &amp; REFRIGERATION PIPING</b>
E.1	Condensing Units / Air Conditioning ODU (with stand-by facility)
E.2	Refrigerant piping in compliance with ASME B31.5
E.3	Drain Piping
<b>F]</b>	<b>ICU USER INTERFACE (User Control Panels)</b>
F.3	ICU Control Interface: Capacitive Touch screen, Size 10 inch
F.4	ICU Room Status Display
<b>G]</b>	<b>ELECTRICAL &amp; INSTRUMENTATION – for ICU Areas</b>
G.1	AHU Sub Panels
G.2	Power Cables
G.3	Control Cables
G.4	VFD – Variable Frequency Drive
G.5	DDC with Panel
G.6	Independent Distribution Box
G.7	Other Instrumentation Accessories
G.8	Earthing for the entire Modular ICU Complex floor
G.9	Switchboards & Sockets, Internal Wiring for lights & sockets etc.
G.10	CAT 6 cabling for each bed from the Nursing Station
G.11	Monitor Stand Mounting Guide
<b>H]</b>	<b>Validation &amp; Performance Testing - to be independently carried out per ICU Room</b>

## Technical Specifications for Supply, Installation, Testing & Commissioning (SITC) of Modular I.C.U Complex on Turnkey Basis as per NABH norms

<b>I]</b>	<b>PASSAGE AREA</b>
I.1	Modular Cleanroom Profile Panels for Ceiling
I.2	Ski-Lite fitting in False ceiling
I.3	Split Ac for Passage Area
I.4	Smoke Exhaust System for Passage along with Pressurization
J.5	Antistatic conductive vinyl flooring along with Self-Leveling
<b>J]</b>	<b>OTHER ANCILLARY WORKS</b>
J.1	Ancillary Civil Work including Demolition (if any)
J.2	Fabrication Work
J.3	Stabilizer
J.4	Generator (after due Voltage fluctuation analysis)
J.5	MGPS work inside ICU

# Technical Specifications for Supply, Installation, Testing & Commissioning (SITC) of Modular I.C.U Complex on Turnkey Basis as per NABH norms

A] MODULAR SETUP COMPONENTS		
A.1	Modular Cleanroom Profile Panels for Ceiling	Qty. - As per site requirement
	<ul style="list-style-type: none"> <li>• Free-standing structure with PUF insulated Panels.</li> <li>• Composite construction of double skins - Front side (inside room) SS 304 &amp; back side (towards the wall) PPGI with a protective film thick over a GI profile framework along the periphery &amp; GI inter-locking section, with base runner.</li> <li>• The panel joints are sealed by silicone for a perfectly flush finish.</li> <li>• The panel core will consist of rigid polyurethane foam, which has been injected under high pressure.</li> </ul> <p><b>Panel specifications:</b></p> <ul style="list-style-type: none"> <li>➤ <b>Panel thickness</b> • 50mm for standard panels for ceilings</li> <li><b>Sheet Thickness</b> - Front SS 304 sheet thickness 0.8mm &amp; back PPGI sheet 0.6mm (90 GSM, 340Mpa)</li> <li>➤ <b>Infill:</b> PUF Insulation. Density 40 Kg/m<sup>3</sup> ± 2 Kg.</li> <li>➤ <b>Panel Joints:</b> The panels are joint together using GI section for interlocking &amp; leveling of panels. The panel joints shall have a seamless finish by applying silicon sealant.</li> <li>➤ <b>Panel Sizes:</b> Std. Width Min.1180mm x Length as per site requirement x 50mm thick</li> <li>➤ <b>Built-in Cut-outs</b> for HVAC / Light fittings etc.: strengthened around cut-outs &amp; covered with SS 304 sheet so that no material (infill) to be exposed.</li> <li>➤ <b>Standards:</b> Confirms to ASTM E 1730</li> </ul> <p><b>Note: The SS 304 &amp; PPGI panel shall be duly certified for its properties.</b></p>	
A.1.1	<b>Bed-Head Panel FOR ICU</b> It consist of Gas Points – 3 Nos., 02-16amp switch socket & 02- 6 amp switch socket, 01- switch for light, 01-monitor stand, 01- SS 304 basket	
A.1.2	S.S. 304 Coving & Connecting Profile	Qty. - As per site requirement
	<ul style="list-style-type: none"> <li>• All joints between Panel to Panel, Wall to ceiling, Wall to Floor shall be covered with SS 304 coving section.</li> <li>• Minimum radius min.50 mm. • Joint between coving and surface shall be sealed with silicon sealant.</li> </ul>	
A.3	Hermetically sealed Door: MOC SS 304 & GI Powder-Coated	Qty. - As per site requirement

## Technical Specifications for Supply, Installation, Testing & Commissioning (SITC) of Modular I.C.U Complex on Turnkey Basis as per NABH norms

	<p>Designed to fit flush into the wall panel system on both sides, fabricated from SS 304 or GI Powdered Coated Sheets.</p> <ul style="list-style-type: none"><li>• <b>Thickness:</b> Shutter has sheet thickness of 0.8mm and the frame of 1.2mm. Door Leaf thickness of 46mm</li><li>• <b>Width:</b> Standard 50/60/80 mm panel has frame width of 50/60/80 mm and shutter width of 42mm.</li><li>• <b>Infill:</b> PUF Insulation</li><li>• <b>Door fittings:</b> SS Ball Bearing Hinges, Latch Lock, Door Closer standard arm, Stainless Steel “D” Type Handle on One side, Stainless Steel Push Plates on “Push” Side, Kick Plates, Automatic Bottom Drop Seal, Concealed Tower Bolt (only for Double door)</li><li>• <b>View Window:</b> Double insulated glass flushed to the door faces, 6mm thick plain Toughened View Glass with Black border &amp; Sealant</li><li>• <b>Door lock:</b> Both side key operated locking arrangement</li><li>• <b>Door size:</b> as per the site requirements. Door opening shall be as per requirements / space availability.</li></ul>
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## Technical Specifications for Supply, Installation, Testing & Commissioning (SITC) of Modular I.C.U Complex on Turnkey Basis as per NABH norms

A.4	Antistatic conductive vinyl flooring along with Self-Leveling	Qty. - As per site requirement
	<b>Compliant to standards:</b>  EN 1081/IEC 613404, EN 1815 & EN 12466, TVOC as per AgBB / DIBt Certifications, ISO 16000-6.,  <b>Properties:</b>  • polyurethane reinforced, scratch resistant, fire resistant, chemical resistant, slip resistant • anti- fungi & bacterial growth • dimensional stability ≤ 0.40%, static electrical charger < 2Kv, • Flooring should be seamless with perfectly curved flush- coving, resistant to mechanical stress and dynamic loads and having protection characteristic • Conductive Washable vinyl in Roll form • <b>Thickness:</b> 2.00mm  <b>Self-Leveling:</b>  • Flooring should be laid on Epoxy based self-leveling compound      • <b>Self-Leveling thickness:</b> 2 to 3mm	
A.5	X-ray View Screen – Twin Plate / Two Film	Qty. - 1 No. per ICU
	• <b>Light source:</b> LED, <b>Power consumption:</b> < 30W • <b>Brightness:</b> > 10,000 Lux, Provision for brightness control • Frame Dimensions: 880 x 503 x 29mm, Viewing Area: 736 x 440mm with Auto film insertion  • Flicker free luminance with Digital Dimmer • Fitment: Flushed with Modular wall panel	
A.6	Magnetic Writing Board (White)	Qty. - 1 No. Per ICU
	• <b>MOC:</b> Magnetic laminated board bonded with 10mm high density fiber board • Magnetic writing board with duster • Colour - Pure white, Size: 600mm x 800mm with • <b>Thickness:</b> 1.5mm	
A.7	Ceiling Peripheral Lights / ICU Luminaires: LED Type	Qty. - As per site requirement
	• Clean Room Recessed Type Luminaires, IP-65grade • Brightness: 1000 Lux illumination above 1 MTR floor level around the ICU Beds • The light fixture will be hermetically sealed from top side (ceiling side) with bottom opening for repair & maintenance • <b>Size: 2ft. x 2ft.</b>	
B] MEDICAL GRADE HVAC SYSTEM with REAL-TIME REMOTE MONITORING & DATA-LOGGING		

## Technical Specifications for Supply, Installation, Testing & Commissioning (SITC) of Modular I.C.U Complex on Turnkey Basis as per NABH norms

	<ul style="list-style-type: none"> <li>✓ Precision Temperature &amp; Humidity Controlled HVAC system</li> <li>✓ Air Handling Units designed for each individual area as per specifications</li> <li>✓ System capable of generating Bubble &amp; Sink as &amp; when required</li> <li>✓ Self de-pressurization capable system to be designed &amp; installed</li> <li>✓ Built-in Automated smoke &amp; fume exhaust mechanism</li> <li>✓ Remote Monitoring &amp; Automatic Data-logging facility</li> <li>✓ Fully IOT based Control &amp; Monitoring</li> </ul>
<b>B.2</b>	<p><b>ICU - Terminal Filter Box with Mini-pleat HEPA Filters</b> <span style="float: right;"><b>Qty. - As per site requirement</b></span></p> <ul style="list-style-type: none"> <li>• Double tight seat system to prevent leakages from sides of filter gaskets, filter frame &amp; pressureframe.</li> <li>• SS 304 Mini-perforated plate/sheet; the vertical flow should achieve homogeneous flow. • The vertical flow should ensure a sterile area of stable air hygiene over the operating table. • The filter module shall be provided with ports for aerosol sample &amp; differential pressure measuring • Each Air filter capable to deliver 550m<sup>3</sup>/h air volume, pressure drop 130Pa • Filter Frame made of extruded aluminum &amp; factory testing for Leakage • Filters are fitted with a lip seal into an installation sub frame with two or four fixing points. • Equipped with a sealing integrity test facility, internal measuring tube &amp; pressure measurement point for monitoring the operating differential pressure. • Suspension and pressure measurement points either at the side or at the top. • Casing made of sheet steel, SS 304 Diffusers for uniform air displacement. • <b>Plenum</b></li> <li><b>MOC:</b> Fully SS 304 with matt polish sheet thickness 0.8 mm. • <b>Terminal HEPA Filter Box Min. size: 2ft. x 1ft. each</b> • <b>One Terminal HEPA Filter unit between 2 ICU beds.</b> • <b>Individual Return Air Suction Diffusers to be fitted for each ICU bed.</b></li> </ul>

## Technical Specifications for Supply, Installation, Testing & Commissioning (SITC) of Modular I.C.U Complex on Turnkey Basis as per NABH norms

B.3	<div>External Air Handling Unit (AHU)</div> <div>Qty.- 1 No. per ICU Room each</div>
	<ul style="list-style-type: none"> <li>Supply, Installation, Testing and Commissioning of Double Skin Air Handling Units (Double-Tier / Single Tier) with all Screws &amp; Nut-bolts in SS &amp; all Exposed Screwed-end to be fitted with PVC caps.</li> <li><b>CAPABLE OF GENERATING SINK / BUBBLE AS PER REQUIREMENT</b></li> <li>AHU Type – Draw-through • Profile - 16G Self Supporting Anodized Extruded Aluminum Hollow Section In Thermal Break Profile And Internal Coving Of Min. 15Mm • Corners &amp; Sections: Heavy Duty PVC With Internal Coving • Panels - minimum 45 mm thick PUF (Non CFC with minimum density 40+ 2 kg/m3) sandwiched insulation panel</li> <li>Inner Skin &amp; Outer Skin - 22G GI Plain 120Gsm, / 22G G.I. 120Gsm resp. Pre- Plasticized • All Internal Framework in Aluminium Extruded Section. • Coil Section to be in SS 304 Matt Finish</li> </ul> <p><b>AHU Compliance to the below standards</b></p> <ul style="list-style-type: none"> <li>Mechanical strength of Casing – En1886 D2 • Casing Air Leakage Test – En1886 L2 • Casing Thermal Transmittance &amp; Thermal bridging – En 1886 T2 &amp; Tb2 • Noise Level &lt; 85Db @ 1mtr. From the unit -</li> </ul> <p><b>AHU Supply Air Fan Capacity – as per site requirements</b></p> <p><b>Fan Static:</b> Total Supply side Static Pa: 1500</p> <p><b>Design Conditions: FOR ICU - Temp 24 ± 2°C, RH 55 ± 5%</b></p> <p><b>AHU sections:</b> AHU to comprise of various sections as described below sequentially in the direction of airflow. AHU to be mounted on anti-vibration mounts. Each section to be properly sized to accommodate below mentioned components:</p> <p><b>Mixing Section:</b> Low Leakage extruded aluminum aerofoil opposed blade type Motorized fresh air damper with extended stem suitable for mounting of ON/OFF actuator • Low Leakage extruded aluminum aerofoil type opposed blade type return air damper suitable for manual operation • Provision for % Opening marking, locking &amp; sealing arrangement.</p> <ul style="list-style-type: none"> <li>Flanged type F-5 Pre filters • Flanged type G4 Fresh air filter • Leak proof Hinged service door</li> <li>Pressure Measurement nozzles across F-5 filter with Magnehaulic Gauge (0-300 Pa) and PU Tube tubing. • Magnehaulic Gauge to be properly enclosed in a box made from 0.8 thick GI sheet, of AHU body color.</li> </ul> <p><b>Note:</b> Air Face Velocities across H-13 &amp; F-5 filters should not exceed 2.5 m/s.</p> <p><b>Plasma filter section:</b> 75 mm thick plasma filter • UL validation for zero Ozone Emission</p> <p><b>Cooling Coil Section:</b></p> <ul style="list-style-type: none"> <li>D-X cooling coil inter-twined for each circuit • Min.4 row (per Circuit) with copper tubes and aluminum fins • Sine wave type fins with spacing of 12 / 13 fins per inch with Hydrophilic Coating • Bypass factor</li> </ul>

## Technical Specifications for Supply, Installation, Testing & Commissioning (SITC) of Modular I.C.U Complex on Turnkey Basis as per NABH norms

(B.F.) of coil should not be more than 0.05 • Coil Fins- 36 Gauge & Coil tubes 26 g SS- 304 insulated: minimum 25 mm thick insulation (MOC of insulation shall be as per AHU manufacturer standard) • PVC moisture eliminator removable sliding arrangement for cooling coil • Condensate tray with drain pipe & G.I. U trap • Concealed Drain Tray made out of 18G SS 304 in Matt Finish with slope to avoid water stagnation. • Nitrile rubber insulation of suitable thickness to avoid condensation • Access door to be provided for drain-pan section for maintenance • Leak proof Hinged service door / Removable Panel with handles. **Note:** Air Face Velocities across cooling coil should not exceed 2.5 m/s.

### Supply Air Fan Section:

- Properly balanced (statically and dynamically) to be selected so as to operate around 45Hz at Average Choke Condition. However, Blower should also be able to operate at Full Choke Condition & at 50Hz in VFD by-pass mode. • Plug Fan/s with pressure ports and directly coupled to Motors and anodized aluminum/ stainless steel Bell mouth air outlet. • Fan housing with motor to be mounted on a
  - common steel base on anti-vibration springs mounts.
- Motor: High Energy Efficient “IE-3 Type”, 415 ± 10% Voltage, 50Hz, 3 Phase, Squirrel Cage • Totally enclosed Fan Cooled class “F” with IP55 Protection Induction Motor • Motor @ 1440 / 2880 Rpm
- Blower Motor Mounting Assembly- In Aluminum Extruded Section & Frame • Frame should be very sturdy to avoid Cracking during operation for longer duration • **Canvass Connection- Double wrapped, Lint-free, Fungal resistant & Fire retardant canvass connection (to avoid fire hazard between Fan & AHU body)** supported on frame. • Leak proof Hinged service door • Flow measurement device comprising of Calibrated Nozzle and Differential Pressure Transmitter • Lamp, Limit Switch & Wiring
  - Double Glazed inspection window made from polycarbonate. Each glazing to be of minimum 6 mm thickness.

### Fine Filter / Bleed & Discharge supply section:

- Filter frame 16G Anodized Aluminum extruded section • Filter Type – Flange type • Filter Fixing arrangement- Threaded inserts as per Standard sizes on Aluminum framework tightened with Hard PVC Wing Bolts with in-built washer £ • Filter Face velocity NMT 500 fpm • Fine Filter: F-7

### Pressure Ports Across Filter Section:

- High and Low Pressure Pvc Nozzle Ports with Provision of Silicon Tube to Be Provided • Fresh Air and Bleed Module with Al. Extruded Aerofoil Low Leakage Dampers with Epdm Food Grade Gasket • Supply and Return Cutout with Al. Extruded Aerofoil Low Leakage Dampers with Epdm Food Grade Gasket
- Magnehelic Gauge of Appropriate Range to Be Provided to Monitor Pressure Drop Across All G-4 & G-7 Filter Sections • View Panel: In Blower Section and Weather Proof Lamp Also to Be Considered

### PID controlled heater bank:

The heater bank must be provided with PID based control for heater operations. • The AHU Mounted bank will be modulated with multi-stage control • The heater bank must come with proper safety

## Technical Specifications for Supply, Installation, Testing & Commissioning (SITC) of Modular I.C.U Complex on Turnkey Basis as per NABH norms

	protection, overload trip protection and an electric panel with all the relevant components including switchgears and cabling.
<b>C] AIR DISTRIBUTION SYSTEM</b>	
<b>C.1</b>	<b>HVAC Ducting : 24 G As per SMACNA class 'A' Qty. – as per site requirements</b>
	Supply, Installation and Testing of CNC machine fabricated G.S.S. Ducting should be complete with - <ul style="list-style-type: none"> <li>• supports, with GI rivets, nut-bolts, with Epoxy painted MS angle Flanges, with 5mm thick neoprene gaskets duly installed between flanges. • Food grade silicon sealant shall be applied in the longitudinal length of a ducts &amp; for all angle flanges.</li> </ul>
<b>C.2</b>	<b>HVAC Duct Insulation : Qty. – as per site requirements</b>
	<ul style="list-style-type: none"> <li>• Duct Insulation with site-glued, Aluminum foil faced, • Closed cell fire rated (FM approved) Nitrile Rubber Insulation of suitable density (40 - 60 kg / m<sup>3</sup>), • Class "O" insulation as per thickness specified,</li> <li>• All joints and corners should be finished with 50 MM wide cross linked oven type Aluminum Self Adhesive Tape. • <b>Size: 19mm for Supply Air Ducts, 13mm for Return Air &amp; Exhaust Air Ducts</b></li> </ul>
<b>D] INTELLIGENT FIRE-SMOKE CONTROL &amp; ALARM SYSTEM</b>	
	<ul style="list-style-type: none"> <li>• The ICU rooms should be provided with independent fire-smoke control &amp; alarm system.</li> <li>• Multi-point fire-smoke sensing system</li> <li>• Automated activation of the system with audio-visual alarm</li> <li>• Independent control box to be provided for this system</li> <li>• Provision for conducting Mock-drill as a part of NBC protocol</li> </ul>
<b>E] CONDENSING UNITS (Outdoor Units) &amp; REFRIGERATION PIPING</b>	
<b>E.1</b>	<b>Condensing Units / Air Conditioning ODU (with stand-by facility) Qty. – As per site system design</b>
	<ul style="list-style-type: none"> <li>• Supply, Installation, Testing &amp; Commissioning of Air-cooled condensing unit. • Outdoor unit should be completed with copper piping, filled with R410a refrigerant gas • Including nitrile rubber Insulation, electrical cabling, thermostatic expansion valves, liquid line strainer, HP, LP switches, control panel along with all other required electrical • With supports, tray, MS stands etc. • Consider 15 meter length between AHU &amp; Outdoor Unit.</li> <li>• <b>Stand-by system</b> -Each condensing unit should have standby compressors with multiple refrigeration circuits and components. • <b>Capacity – as per site requirements</b></li> </ul>
<b>E.2</b>	<b>Refrigerant piping in compliance with ASME B31.5</b>
	Supply, Installation, Testing & Commissioning of copper piping with all necessary fittings for refrigerants <ul style="list-style-type: none"> <li>• Copper tubing, Expansion Valve, Dryer Filter, Gas charging etc. refrigeration accessories</li> </ul>
<b>E.3</b>	<b>Drain Piping</b>

## Technical Specifications for Supply, Installation, Testing & Commissioning (SITC) of Modular I.C.U Complex on Turnkey Basis as per NABH norms

	<ul style="list-style-type: none"> <li>• Supply, Installation &amp; Testing</li> <li>• Insulated GI 'B' class drain piping with aluminium foil faced nitrile rubber • insulation, with SORF flanges, nut-bolts, supports with wooden block etc. duly installed.</li> </ul>
<b>F] ICU USER INTERFACE (User Control Panels)</b>	
<b>F.3</b>	<b>ICU Control Interface: Capacitive Touch screen, Size 10 inch</b> <span style="float: right;"><b>Qty. – 1 No. Per ICU</b></span>
	<ul style="list-style-type: none"> <li>• Independent PLC working logic • Real-time Clock • Display &amp; Settable control for Room temperature &amp; Relative Humidity (RH) • HEPA pressure display (digital) • Medical Gas status display with Alarms</li> <li>• ICU room periphery luminaire lighting switches with dimmable light control</li> </ul>
<b>F.4</b>	<b>ICU Room Status Display</b> <span style="float: right;"><b>Qty. – 1 No. Per ICU</b></span>
	<ul style="list-style-type: none"> <li>• Room Pressure, • Automated De-fumigation (Fumes Exhaust) • Emergency ICU Room Lighting Switch</li> </ul>
<b>G] ELECTRICAL &amp; INSTRUMENTATION – for ICU Areas</b>	
<b>G.1</b>	<b>AHU Sub Panels</b> <span style="float: right;"><b>Qty. – 1 No. per AHU</b></span>
	<ul style="list-style-type: none"> <li>• Supply, Installation, Testing &amp; Commissioning of floor mounted local AHU panel</li> <li>• With VFD &amp; with bypass arrangement • MOC - 16 gauge CRCA powder coated construction suitable to house VFD (with harmonic filter) for fan motor. • The panel shall also accommodate power for heaters (wherever specified as per air flow schematics). • The panel shall be mounted on channels suitable for grouting to the floor. • Panel should be compartmentalized with front/rear maintenance and with top entry for incoming &amp; outgoing cables. • This panel shall be supplied with the Incomer MCCB of suitable rating, Phase indication &amp; trip status lamps, with cable alleys, necessary contactors and control switchgears with necessary arrangement for supply to heaters, fire dampers, VFD. • This panel shall be provided with ventilation fan for VFD &amp; shall be installed near to AHU • Panel shall be provided with appropriate earth bus / connection provisions for providing the required earthing.</li> <li>• Emergency push buttons with mushroom head to be provided. • <b>Interlocking B/W fans, FA, EA &amp; SA dampers and also with various other process equipment's if required. Fault Level - 25kA.</b></li> </ul>
<b>G.2</b>	<b>Power Cables</b>
	<p>Supply, Laying, Testing and Commissioning of Industrial Grade Flexible single core / multi-core cables as per site requirements</p> <p><b>Standards</b></p> <ul style="list-style-type: none"> <li>• <b>Confirming to IS 694/ IS 17048/ BS 6231/ BS 6004/ BS 7211 / BS 50525-2-11, 2-31, 3-11</b></li> <li>• <b>FRLSH (Flame Retardant Low Smoke Halogen) • RoHS &amp; REACH Compliant</b></li> <li>• 1.1KV Grade XLPE/PVC insulated aluminum/copper multi strands conductor steel of Armoured/flexible braid power cables of various sizes as per the requirement. • Laying of Cables in horizontal/vertical formation on wire mesh cable trays, supported along RCC/steel structures if required, pipe racks and cable supports provided, • Includes unloading, shifting upto site at various location/levels, unpacking &amp; inspection. • The scope includes clamping of cables by readymade spacers, saddles or clamps fabricated out of Aluminum strip 3 mm thick along vertical runs and wherever specified, cutting of the cable as per actual measurement/cable schedule, Teasing and Clamping of Cable on cable tray Velcro tap of minimum 20mm width or clamping materials in Aluminum or PVC cable tie as per site hygiene level and hardware etc., • Supply &amp; providing cable tags made out of Aluminum strip and 75x20 mm in size with cable number and size punched on it. • Cable tags shall be tied to cables at every 20-meter interval and at both</li> </ul>

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	the ends.
<b>G.3</b>	<b>Control Cables</b>
	<p>Supply, Laying, Testing and Commissioning of Control cables</p> <ul style="list-style-type: none"> <li>• For all controlling operations as shown in Schematics, including for all actuators, heaters, Fan interlocking and other equipment's to be controlled.</li> </ul>
<b>G.4</b>	<b>VFD – Variable Frequency Drive</b> <span style="float: right;"><b>Qty. - 1No. per AHU Panel</b></span>
	<ul style="list-style-type: none"> <li>• Supply and Installation of HVAC Series, VFD with 4nos PID Loop and (Smart Logic Controller) Built in With additional I/O Card suitable for hospital application. • VFD to be suitable for Normal Induction Motor and PM Motor Operation. • DC to be Built in to limit Harmonic Distortion. • The VFD should have in built controller for closed loop HVAC functions. • <b>Rating – As per site requirements</b></li> </ul>
<b>G.5</b>	<b>DDC with Panel</b> <span style="float: right;"><b>Qty. - 1No. per AHU Panel</b></span>
	<ul style="list-style-type: none"> <li>• The DDC controllers shall be 32 bit microprocessor based standalone and networkable type with real time clock and historical database of min 1 Mb. • The DDC's shall be capable of peer to peer communication without help of system interface controller or PC. • With all suitable metal enclosures 1mm thick, IP42 enclosure, top cable entry, powder coated. • The DDC controller housed in panel with necessary accessories like power supply Unit, Protection Devices and Complete wiring.</li> </ul>
<b>G.6</b>	<b>Independent Distribution Box</b> <span style="float: right;"><b>Qty. - 2 Nos.</b></span>
	<p>Separate distribution boxes shall be provided for the separation of cabling from the ICU room to the existing DG of the hospital. Another DB should be provided for the cabling from the ICU room to the new DG which will take care of the new load.</p>
<b>G.7</b>	<b>Other Instrumentation Accessories</b> <span style="float: right;"><b>Qty.- As per design requirements</b></span>
	<ul style="list-style-type: none"> <li>• Temperature &amp; RH Sensors &amp; transmitters • Smoke Sensors – International CE certified • Velocity Sensors</li> </ul>
<b>G.8</b>	<b>Earthing for the entire Modular ICU Complex floor</b> <span style="float: right;"><b>Qty. – as required by electrical design</b></span>
	<p>Supply and installation of Chemical earthing station • Dimensions - 2.0 mtr. Long, dia. 80 mm copper coated Pipe in Pipe type • The contractor has to make a 3.5 mtr. deep 450 mm dia. bore in hard rock / soft soil, fill the outer side 100 mm dia. of the bore with Black cotton soil and Balance 250 mm dia bore and 3100 mm deep shall be filled chemical earth electrodes treatment as per standard drawing. • 4 sq. mm Cu.</p>

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	Wire Green Colour only, 50 x 10 mm GI. Strip, EARTHING OUTLET FOR ELECTROSTATIC DISCHARGE with 2.5 Sq.mm Cuwire with crocodial clamps and front SS cover.	
G.9	Switchboards & Sockets, Internal Wiring for lights & sockets etc.	
	Switchboards & Sockets with necessary number of modular box, polycarbonate front and rear plate,modular switches, switch sockets & blank plates. ▪ Switchboard points & Light points  • Switchboard Wiring 3C x 2.5 Sq.mm Cu. PVC Flexible FR Cable including Termination at both ends.	
G.10	CAT 6 cabling for each bed from the Nursing Station	Qty.- As per design requirements
	The bidder shall provide CAT 6 cable from the main nursing station in the ICU room up to each bed-head panel for the sake of future compatibility of CMS system.	
G.11	Monitor Stand Mounting Guide	
	The bidder shall provide monitor stand mounting guide so that the hospital can ensure that the patient monitor is correctly positioned whenever it is fitted by the hospital.	
H] Validation & Performance Testing - to be independently carried out per ICU Room		
	<ul style="list-style-type: none"><li>Validation, Performance testing, balancing of the HVAC system designed to achieve the <b>ISO 14644/1 classification</b> Parameters<ul style="list-style-type: none"><li><b>ICU specifications – ISO 8 for ICU room</b></li></ul></li></ul> Clean room validation to be done OT at rest & in operation conditions. <ul style="list-style-type: none"><li>a. Air balancing with Flow Hood</li><li>b. Room Pressure Balancing</li><li>c. HEPA Filter Integrity Test</li><li>d. Particle count test</li></ul>	
I] PASSAGE AREA		
I.1	Modular Cleanroom Profile Panels for Ceiling	Qty - as per the site requirements
	<ul style="list-style-type: none"><li>Free-standing structure with PUF insulated Panels.</li><li>Composite construction ofdouble skins – <b>Both sides PPGI</b> with a protective film thick over a GI profile framework along the periphery &amp; GI inter-locking section, with base runner.</li><li>The panel joints are sealed by silicone for a perfectly flush finish.</li><li>The panel core will consist of rigid polyurethane foam, which has been injected under high pressure.</li></ul> <b>Panel specifications:</b> <ul style="list-style-type: none"><li>➤ <b>Thickness:</b> Panel thickness 50mm, PPGI sheet thickness 0.6mm (90 GSM, 340Mpa, RAL 9002)</li><li>➤ <b>Infill:</b> PUF Insulation. Density 40 Kg/m3 ± 2 Kg.</li><li>➤ <b>Panel Joints:</b> The panels are joint together using GI section for interlocking &amp; leveling of panels. The panel joints shall have a seamless finish by applying silicon sealant.</li><li>➤ <b>Panel Sizes:</b> Std. Width Min.1180mm x Length as per site requirement x 50mm thick</li><li>➤ <b>Built-in Cut-outs</b> for HVAC / Light fittings etc.: strengthened around cut-outs &amp; covered with PPGI sheet so that no material (infill) to be exposed.</li></ul>	
I.2	Ski-Lite fitting in False ceiling	Qty. – 1 No.

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	Supply, & fitment of Stretch ceiling type OR Alabaster type ceiling • This ceiling should be enclosed in a appropriate Aluminum frame after making a cut-out in the modular profile PPGI PUF panel ceiling • The image / picture would be confirmed by the User. • To be fitted flushed to the false ceiling with required hardware with standard framework & sealant.
<b>I.3</b>	<b>Split Ac for Passage Area</b>
	<b>Rating – Min. 3 Star Invertor AC • Capacity</b> to be determined as per site requirements
<b>I.4</b>	<b>Smoke Exhaust System for Passage along with Pressurization</b>
	The ICU passage area should be should be pressurized & fitted with an automated smoke exhaust mechanism to ensure efficient & effective protection.
<b>I.5</b>	<b>Antistatic conductive vinyl flooring along with Self-Leveling</b> Qty. - As per site requirement
	<p><b>Compliant to standards:</b> EN 1081/IEC 613404, EN 1815 &amp; EN 12466, TVOC as per AgBB / DIBt Certifications, ISO 16000-6.,</p> <p><b>Properties:</b></p> <ul style="list-style-type: none"> <li>• polyurethane reinforced, scratch resistant, fire resistant, chemical resistant, slip resistant,</li> <li>• anti- fungi &amp; bacterial growth • dimensional stability <math>\leq 0.40\%</math>, static electrical charger <math>&lt; 2Kv</math>,</li> <li>• Flooring should be seamless with perfectly curved flush- coving, resistant to mechanical stress and dynamic loads and having protection characteristic • Conductive Washable vinyl in Roll form.</li> <li>• <b>Thickness:</b> 2.00mm</li> </ul> <p><b>Self-Leveling:</b></p> <ul style="list-style-type: none"> <li>• Flooring should be laid on Epoxy based self-leveling compound. • <b>Self-Leveling thickness:</b> 2 to 3mm</li> </ul>
<b>J] OTHER ANCILLARY WORKS</b>	
<b>J.1</b>	<b>Ancillary Civil Work including Demolition (if any)</b> Qty. – As per site requirements
	All jobs such as demolition / breaking / reconstruction of doors / windows / walls etc. required for Modular ICU related work: installation / fitment of Doors / Windows / Scrub / Waterproofing / civil foundation etc. required for completion of the said modular setup.
<b>J.2</b>	<b>Fabrication Work</b> Qty. – As per site requirements
	Fabricated structure / shed for AHU & Outdoor units, Supports / Stands / Ladders for Ducting, AHU, ODU, Electrical wiring & Copper piping, Drain etc.
<b>J.3</b>	<b>Stabilizer</b> Qty. & Rating – as per site requirements
	INDUSTRIAL GRADE 3Ph Servo Controlled Voltage Stabilizer. I/p (300-460)VAC O/p (415)VAC. +/-1%
<b>J.4</b>	<b>Generator (after due Voltage fluctuation analysis)</b> Qty- As per site requirements
	Suitable capacity generator for Modular ICU complex with AMF panel and wiring.
<b>J.5</b>	<b>MGPS work inside ICU</b> Qty.- As per site requirements
	<p>MGPS piping inside ICU Pedant connections to comply with the Standards mentioned below: <b>BS EN ISO 7396 - 1, NFPA 99, Type 1, HTM 02-01</b></p> <p>The bidder shall provide for appropriate gas pipelines to match the existing provision of gases in the hospital. Also, the new Gas pipeline from each ICU bed-head panel shall be connected to a Gas Alarm system &amp; Valve box before being finally connected to the existing main gas line of the hospital.</p> <p>The bidder shall provide for Gas Manifold as per MGPS standards &amp; the number of ICU patients in case there is no Gas Manifold provision for the ICU.</p>